

The Bait Shrimp Industry of the Gulf of Mexico

by

ANTHONY INGLIS¹ AND EDWARD CHIN¹

Revised by Kenneth N. Baxter, Fishery Biologist

Bureau of Commercial Fisheries
Biological Laboratory, Galveston, Tex.

INTRODUCTION

Live shrimp is the preferred bait for sea-trouts, redfish, flounders, and most game fishes of the bays and inshore waters of the Gulf of Mexico. The use of shrimp for bait has given rise to a large industry in some areas. About 85 million live shrimp and 520,000 lb. (pounds) of dead shrimp with a wholesale value of \$1 million were used by the bait industry of Florida in 1964. During the same year in Galveston Bay, Tex., more than 850,000 lb. of shrimp with a retail value of almost \$1 million were taken for bait. It is apparent that catching shrimp for bait is an important industry in the Gulf States. We shall describe the fishing gear used by bait fishermen, the methods of operation, and the marketing practices in Texas and Florida. In other areas of the Gulf, marketing procedures may differ considerably, but fishing gear and methods of operation are similar.

KINDS OF SHRIMP IN THE BAIT FISHERY

The bait fishery is based on three kinds of penaeid shrimp, also used as human food: the white shrimp, the brown shrimp, and the pink shrimp. The kind that predominates varies according to locality and time of year.

On the northeast coast of Florida, the bait fishery north of New Smyrna depends on white shrimp, and that from New Smyrna to Fort Pierce is based on brown and pink shrimp. On the west coast of Florida from Cedar Key to Naples, the catch is chiefly pink shrimp.

¹Anthony Inglis is now Fishery Biologist with the Bureau of Sport Fisheries and Wildlife, Patuxent Wildlife Research Center, Laurel, Md.; and Edward Chin is now Associate Professor in Biology, Texas A&M Marine Laboratory, Galveston, Tex.

In Galveston Bay on the Texas coast, brown shrimp dominate the bait catch from May through the middle of July and white shrimp from August through April. Pink shrimp are more abundant in the bait fisheries farther south along the Texas coast.

Other shrimp that occasionally enter the bait fishery include the seabob and the broken-neck shrimp. In some areas, freshwater river shrimp that enter the bays after periods of heavy rainfall are used by the bait fishery. Several species of grass shrimp are numerous along the marshes of inshore waters and are commonly mistaken for the young of commercial varieties of shrimp. Although grass shrimp are hardy, they seldom exceed 2 in. (inches) in length and are not used to any extent by the bait fishery. The eggs of grass and river shrimps are carried under the abdomen by the female, but the eggs of the common commercial shrimps are shed into the water.

GENERAL LIFE HISTORY OF BAIT SHRIMPS

Spawning takes place in the open waters of the Gulf. Of the three species, the white shrimp spawns closest to shore, the brown shrimp farthest from shore, and the pink shrimp at intermediate distances. From 500,000 to 1,000,000 eggs are shed during a single spawning. The eggs measure about a hundredth of an inch in diameter; they sink to the bottom and hatch about 24 hr. (hours) after being spawned.

The larvae are free floating for about 3 wk. (weeks), during which time they move from the offshore waters of the spawning grounds into the bays, estuaries, and marshes. The shrimp then adopt a bottom-dwelling existence, apparently for the first time (fig. 1). Four to 10 wk. of rapid growth are spent in the inside waters. As the shrimp mature and increase in size, they gradually move back to the offshore spawning grounds.

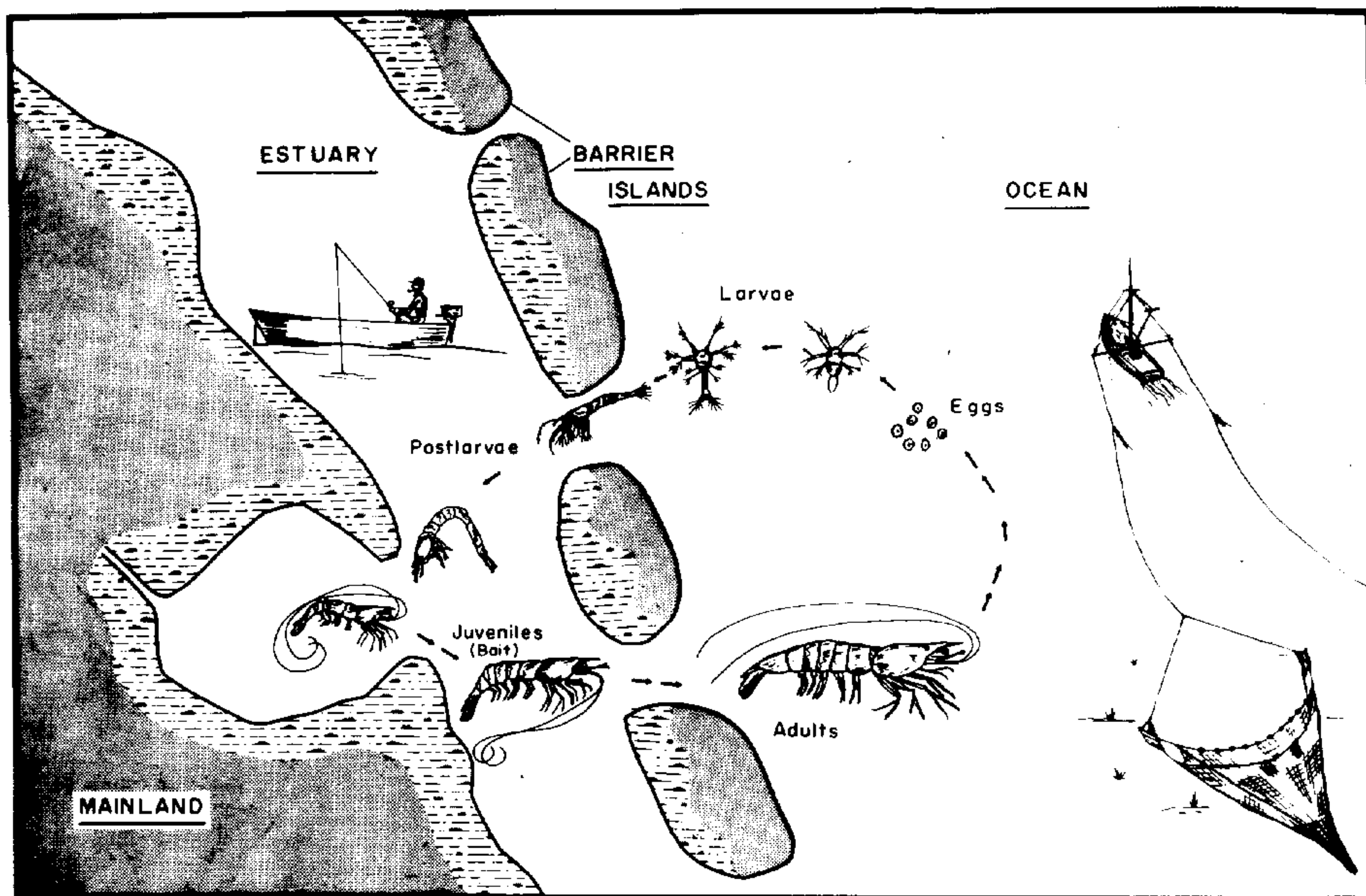


Figure 1.--Life cycle of bait shrimps.

BAIT SHRIMP INDUSTRY OF GALVESTON AREA, TEX.

Fishing Gear and Methods of Operation

Bait shrimp are caught almost exclusively with otter trawls in Galveston Bay. These trawls measure 12 to 25 ft. (feet) between the doors. Sometimes fishermen use a 5-ft. try net to locate schools of shrimp before the larger net is put overboard. Small cast nets and minnow seines are used by sports fishermen to obtain shrimp for personal use but are not used by commercial operators. Bait nets are usually made with No. 9 or 12 nylon twine. Mesh sizes vary from 1 1/4 to 2 in. stretch measure. The doors used for spreading the nets are 36 to 60 in. long and 18 to 30 in. wide. The nets are towed from small inboard trawlers 18 to 28 ft. long, or from 14- to 16-ft. skiffs, equipped with 40- to 75-hp. (horsepower) outboard motors.

Current Texas regulations require each commercial bait shrimp boat to be registered and licensed. The annual fee is \$30. This license entitles the buyer to take from inside waters or have aboard up to 150 lb. of shrimp (heads attached) of any size for use as bait. It is unlawful to sell or unload shrimp from a bait shrimp boat except to a bait shrimp

dealer or to a sports fisherman while in the bay. Each boat is allowed two nets--one trawl not to exceed 25 ft., and a 5-ft. try net.

Although bait shrimping is carried on throughout the year, most of the production occurs from May through October.

When shrimp are abundant, each boat makes 10 to 20 hauls per day, depending on the demand. To prevent excessive death of shrimp, fishing is generally confined to the hours just before dawn and is concentrated as near to the major retail outlet as possible. As a result, the bait shrimp fishery is chiefly a bay fishery.

The catch is unloaded into a bait well on the boat and sorted. Nonsalable fish and trash are discarded immediately. Large blue crabs are saved for later sale, either as food or as bait for redfish. Dead shrimp are saved for the dead-bait market, or if sufficiently large and numerous, are sold as food. Some live shrimp are brought to the retail outlet in barges or modified skiffs towed behind or alongside the boat. The barges and skiffs are partitioned into a number of compartments. The compartments fore and aft are airtight to keep the barge afloat. The middle compartments, in which the shrimp are held, are perforated on the bottom and sides to permit water flow.

Transporting and Holding Methods

During winter, when shrimp are scarce in the Galveston area, some dealers haul shrimp from more temperate southwestern Gulf areas in tank trucks. The bait available for transport at this time of year is usually pink shrimp, the most hardy of the three species. Tanks are made of plywood and divided into several compartments, each provided with a screened top to prevent shrimp from escaping. The carrying capacity of each tank is considered by dealers not to exceed 200 qt. (quarts) of shrimp. A gasoline-powered brass pump provides aeration by continually recirculating the water. A few dealers aerate the water by bubbling oxygen through air stones from oxygen cylinders, but this method is not widely used because the expense is substantially increased without significant increase in survival.

Two types of holding pens are common. One type is made from cypress slats or perforated fiberboard and is suspended in the water (fig. 2). Water exchange is by natural currents and tidal movements. The live-boxes can be raised

by a simple but effective winch arrangement. The other type is a watertight tank set on the ground and made of concrete, fiberboard, plywood, or planks (fig. 3). Water for aeration is pumped into the tank continuously, and waste products pass out the overflow. Shade is usually provided to keep the water cool and to prevent excessive plant growth. Most wooden holding tanks are 4 by 4 by 8 ft., but some concrete tanks measure 4 by 4 by 16 ft. Circular concrete tanks 4 ft. deep and 12 to 18 ft. in diameter have recently become popular. Holding capacity is 30 to 80 qt. of shrimp for the smaller tanks and 75 to 150 qt. for the larger tanks. Each dealer has two or three tanks; a few have as many as six.

Trade Practices

Trade practices are complex in Galveston Bay. If a dealer owns and operates the fishing boat, he retains the full retail value of the shrimp. If a dealer owns the boat, but hires a boat operator, he pays the operator one-third the retail value of the shrimp. When the dealer buys shrimp from an independent

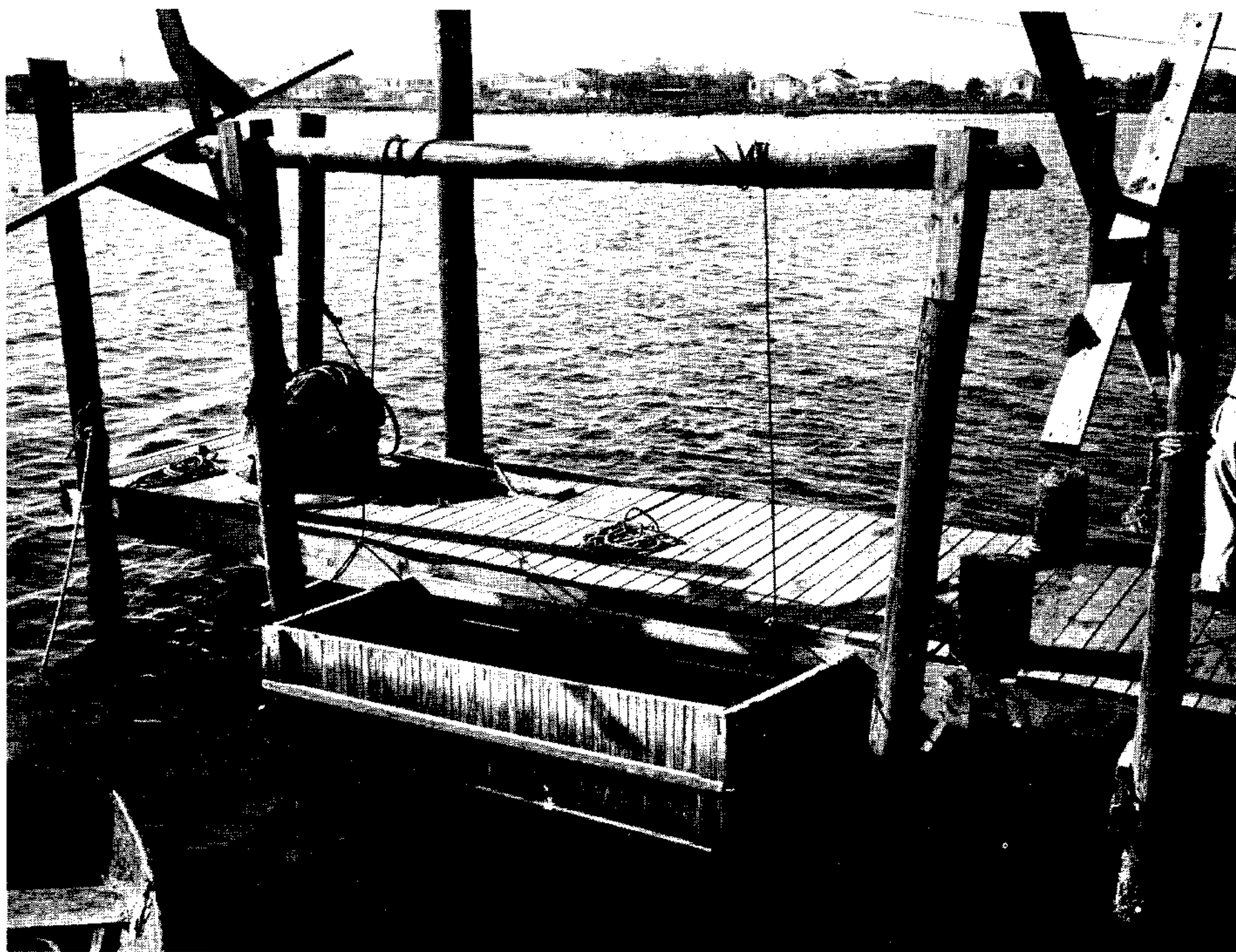


Figure 2.--Live-box for holding bait shrimp.



Figure 3.--Concrete holding tanks for bait shrimp.

boatowner, he pays the owner one-half the retail value. In the last transaction, if the actual fishing was done by a hired operator, he in turn receives one-fourth the retail value from the boatowner. Further complications arise from the common practice of dealers handling a catch on consignment. Under this arrangement, any loss because of mortality is sustained by the boatowner.

Live shrimp are retailed by number or by the quart. When sold by the quart, shrimp are measured with a perforated, plastic container sewn into the bottom of a dip net (fig. 4). During the summer, when shrimp are plentiful, the retail price of live shrimp averages \$2.00 per quart or 2¢ per shrimp in the upper Texas coast and \$3.00 per quart or 3¢ per shrimp in the Port Isabel area. During the winter, when shrimp are scarce, the price in the upper coastal areas rises to \$3.00 per quart and in the Port Isabel area is as high as \$5.00 per quart. Dead bait is sold at 50 to 75¢ per pound throughout the year. One qt. of live shrimp is about

equivalent to 1 1/2 lb. of heads-on shrimp, or 100 shrimp.

FLORIDA BAIT SHRIMP INDUSTRY

Fishing Gear and Methods of Operation

A variety of fishing gear is used in Florida. On the northeast coast, most bait shrimp are caught with cast nets, dip nets, push nets, or otter trawls. In the Biscayne Bay area, otter trawls and frame trawls are used extensively. In the Florida Bay area, both frame and otter trawls are common, but most of the catch is obtained with bridge and channel lift nets. On the west coast, the center of the Florida bait shrimp industry, most fishermen use side-frame trawls. Stop nets, now illegal in Florida, were popular in the Indian River area during World War II.

The push net consists of netting attached to a rectangular frame, 3 to 10 ft. long by

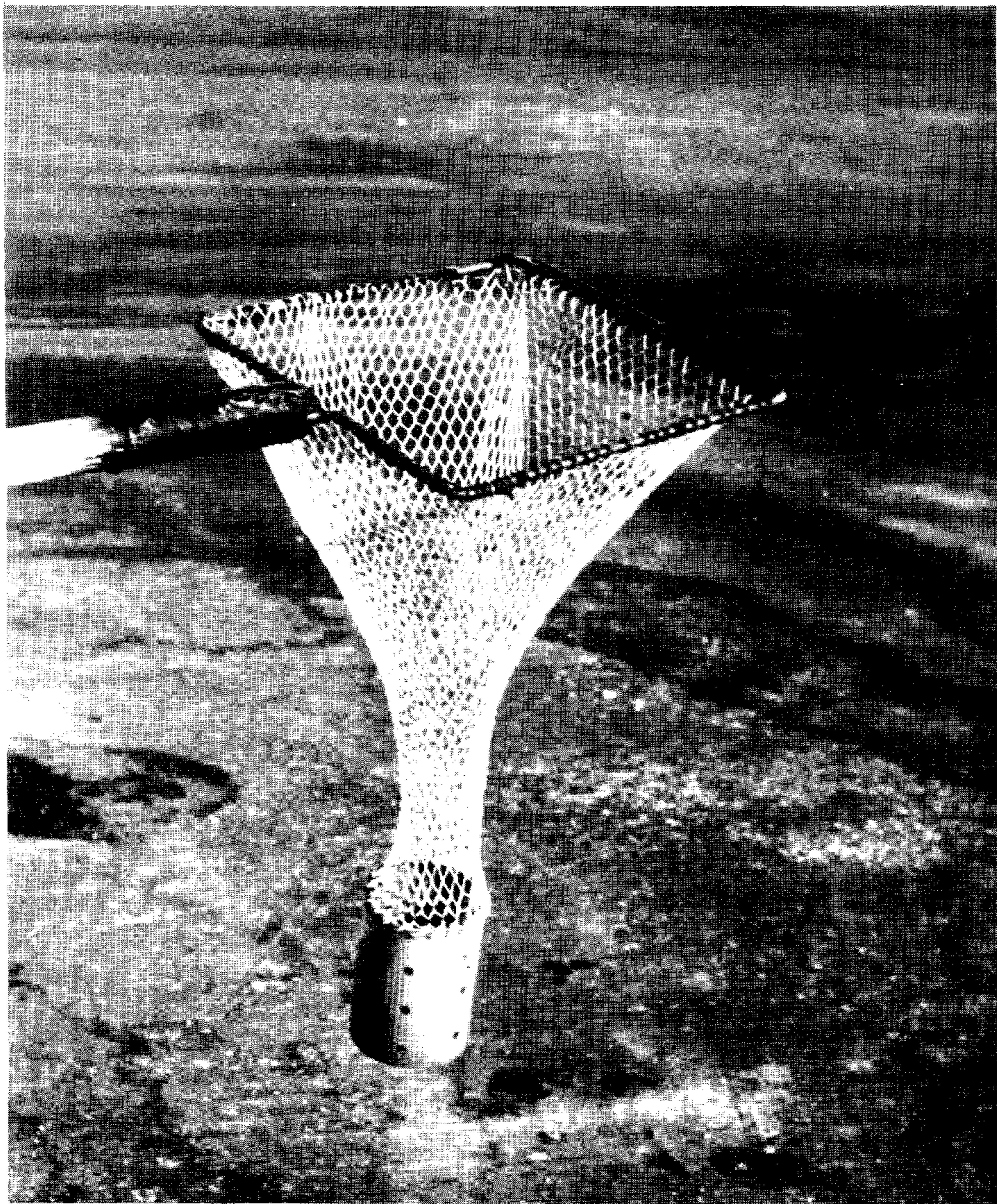


Figure 4.--Dip net used to measure 1 qt. of live shrimp.

2 to 4 ft. wide, with a 6- to 8-ft. handle attached across the midpoints of the long sides (fig. 5). The handle has a cross piece at the end. The net is fished in 3 ft. of water or less, and is pushed by the operator for periods of 10 to 30 min. (minutes). The catch is emptied into a skiff towed behind the operator and is sorted either by him or by a partner in the skiff.

Dip nets are constructed from large hoops 2 to 3 1/2 ft. in diameter, from which is suspended netting of 1/2-in. mesh at the mouth and 1/4-in. mesh near the tail. The handle is 6 to 8 ft. long. Dip-netting is done at night from a boat anchored in water 10 to 20 ft. deep. Some dip-netting is done from bridges and abutments.

Cast nets are circular, 12 to 14 ft. in diameter. A lead line is connected to a central drawstring. When the net is thrown, the lead line sinks to the bottom and envelops animals over which it falls. As the net is retrieved, the drawstrings close the bottom of the net to form a bag.

The small otter trawls used in some areas of northeast Florida are similar to those in

the Texas bait fishery. This gear is not considered satisfactory by Florida bait fishermen for capturing live shrimp, and is used mostly for obtaining shrimp for food or dead bait. On the west coast of Florida, the otter trawl has been replaced to a large extent by the side-frame trawl.

The side-frame trawl consists of a net attached to the lower part of a galvanized pipe framework (fig. 6). The mouth of the net is usually 2 1/2 ft. by 6 ft., but some larger ones are used. The net is made of No. 6 or 9 cotton or nylon twine and is 9 to 18 ft. long. Mesh sizes vary from 3/4- to 1-in. stretched measure. A roller of metal or wooden slats is attached to the bottom of the frame for operation over grass beds. Excessive amounts of seaweed and trash are prevented from entering the net by iron rods fixed vertically at the mouth of the frame. The frame trawl is raised and lowered by block and tackle attached to a crossbeam. Most boats are rigged with two nets that are fished and hauled simultaneously, if the vessel is equipped with power winches, or alternately, when the gear is handled manually.

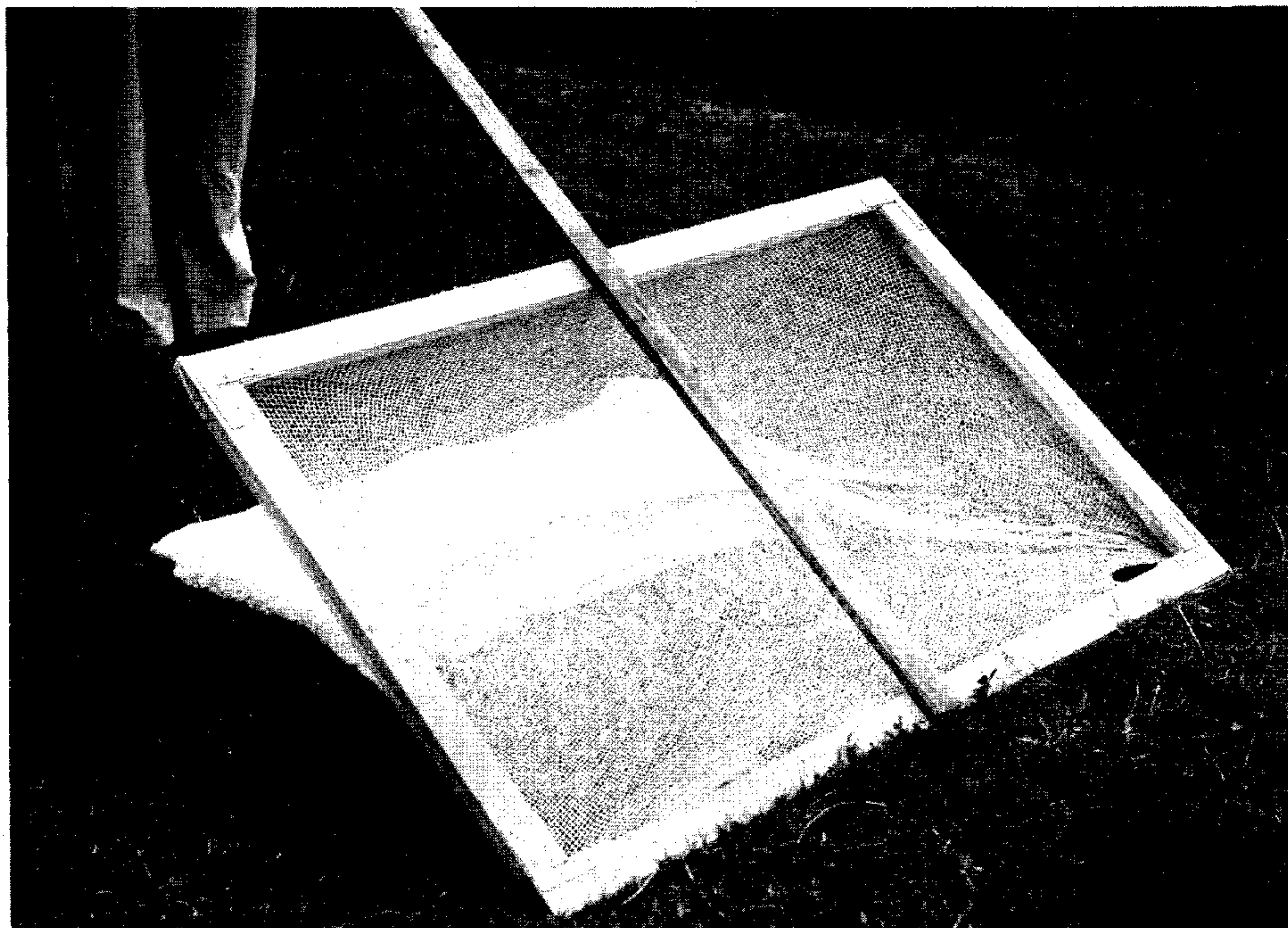


Figure 5.--Push net used to catch shrimp in shallow, grass-covered areas.

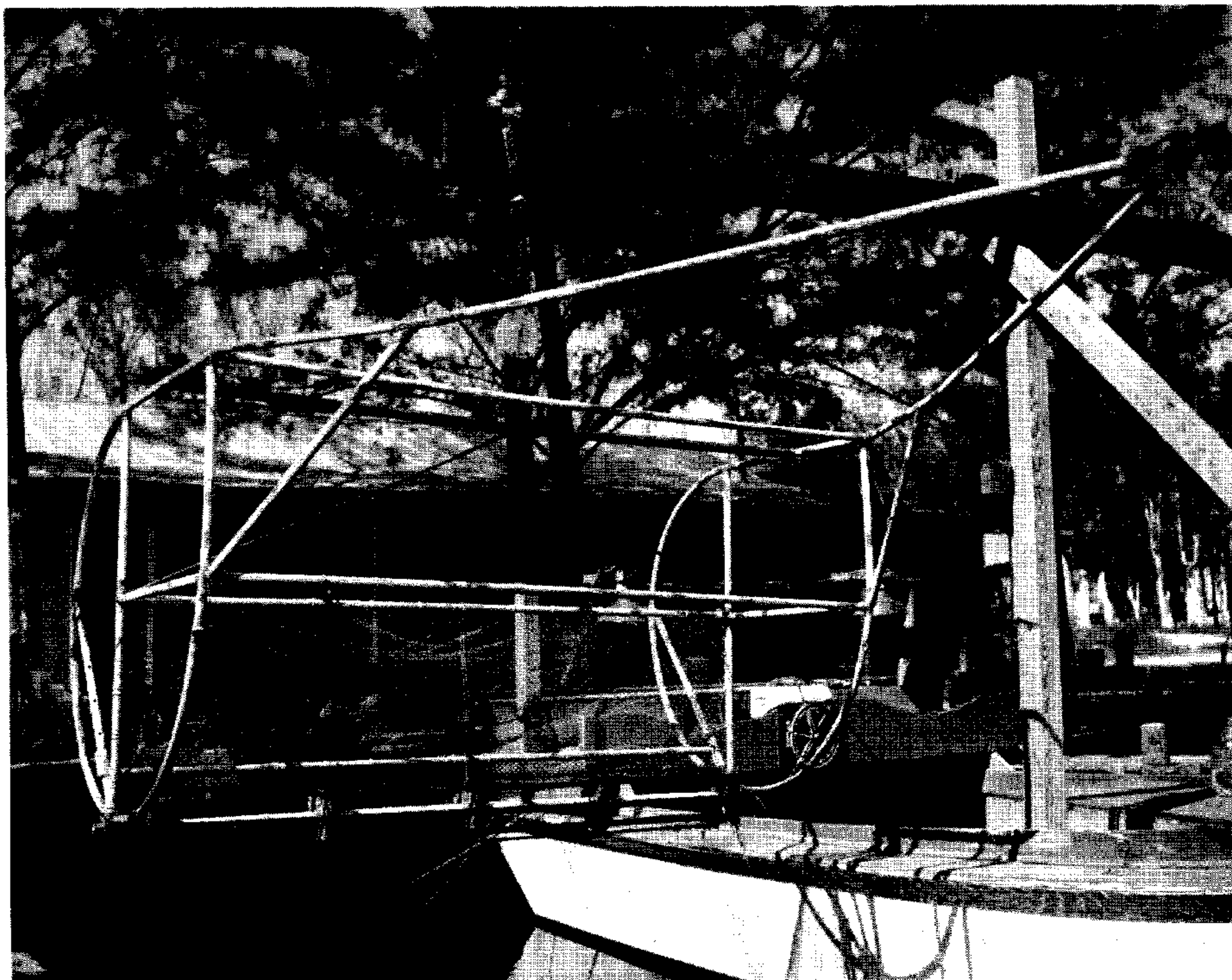


Figure 6.--Bait boat rigged with side-frame trawls.

Normal operations require a crew of two men.

Because of the nocturnal habit of the brown and pink shrimp, which form the basis of the fishery, side-frame trawling is done at night. Each haul lasts 10 to 15 min. When the trawl is lifted, the shrimp are sorted and placed in bait wells on the boat. Other invertebrates, trash, and fish are returned to the water.

Transporting and Holding Methods

In Florida, where centers of bait production are often far from centers of demand, transportation of shrimp in tank trucks is more extensive than in Texas. The trucking units are similar to those used in Texas, but generally have a larger carrying capacity.

Holding pens are also similar to those in Texas. The type that is suspended in water, however, is usually covered with plastic or wire screen instead of the cypress slats or perforated fiberboard commonly used in Texas.

In some areas bait wells built into floating docks are popular.

Trade Practices

The price structure is more complex in the Florida bait fishery than in the Texas fishery. Depending on the locality and the supply, the retail price of bait shrimp fluctuates between 35¢ and 75¢ per dozen. As in the Texas area, some retail dealers own and operate their own fishing vessels and retain the full retail value of the shrimp. Retail dealers located near centers of shrimp production can buy directly from wholesale dealers at \$12 per thousand. Truckers also obtain shrimp from wholesale dealers at \$12 per thousand for transporting and selling to retail dealers in areas where the supply is insufficient to meet the demand. Truckers receive from \$15 to \$20 per thousand depending on the distances involved. Most wholesale dealers obtain shrimp from independent boats at a cost of \$10 per thousand.

If a boat operator is hired, he is paid \$6 per thousand shrimp by the boatowner.

SUGGESTIONS FOR HOLDING LIVE BAIT SHRIMP

Because individual shrimp are held in captivity for only a short time, their survival and well-being depend on relatively few factors. Density of stocking in the pens, disposal of waste products, and oxygen content of the water appear to be of major importance.

Overstocking is undesirable for several reasons. As numbers of shrimp in a tank increase, waste products and oxygen demand also become greater. If excess waste products are not disposed of by increasing the water circulation or by filtration, they can reach deadly levels. Greater oxygen demand should be met by increasing the water circulation or by aerating the water. Even if water flow and aeration are not problems, overstocking can cause considerable loss; shrimp are cannibalistic and are more prone to attack one another when crowded.

The number of shrimp kept in holding tanks ranges from 3 shrimp per cubic foot, if the water is not circulated, to 40 shrimp, if the water is circulated. A water flow of 8 to 10 gal. (gallons) per minute has been suggested. These figures vary somewhat in different situations and are best determined by the individual dealer through experience and ob-

servation. To increase the holding capacity, many dealers put small stingrays, with barbs removed, into the holding tanks to keep the shrimp moving, which, in turn, provides better use of available space.

Salinity and temperature of the water in holding pens are of lesser importance, but drastic changes should be avoided. Sea water should be pumped from a deep source to keep salinity and temperature changes to a minimum. Shrimp survive well at temperatures between 60° and 70° F. and at salinities of 15 to 28 p.p.t. (parts per thousand). In areas of strong sunlight, shading of holding tanks is strongly recommended to keep the water cool and retard formation of plant growths on the sides of the tank.

Bait shrimp are not normally held for long periods, so feeding is not essential and is even undesirable. At warm temperatures, uneaten food spoils rapidly and fouls the water. The pens usually contain sufficient dead shrimp to supply food for the survivors. If uneaten after a short time, dead shrimp should be removed from the pens to prevent fouling. Bait pens suspended in water should be constructed with double bottoms and sides to prevent fish from eating the legs of shrimp.

The use of polyethylene or similar plastic piping is recommended for several reasons. Many plastics are relatively inexpensive and they do not rust. They are inert and thus will not add harmful materials to the water.

COMMON AND SCIENTIFIC NAMES OF SPECIES MENTIONED IN TEXT

Crustaceans

White shrimp	<u>Penaeus setiferus</u>
Brown shrimp	<u>Penaeus aztecus</u>
Pink shrimp	<u>Penaeus duorarum</u>
Seabob	<u>Xiphopeneus krøyeri</u>
Broken-neck shrimp	<u>Trachypeneus constrictus</u>
	<u>Trachypeneus similis</u>
River shrimps	<u>Macrobrachium</u> spp.
Grass shrimps	<u>Palaemonetes</u> spp.
Blue crab	<u>Callinectes sapidus</u>

Fishes

Speckled seatrout	<u>Cynoscion nebulosus</u>
Silver seatrout	<u>Cynoscion nothus</u>
Sand seatrout	<u>Cynoscion arenarius</u>
Redfish (Red drum)	<u>Sciaenops ocellata</u>
Southern flounder	<u>Paralichthys lethostigma</u>
Gulf flounder	<u>Paralichthys albiguttus</u>
Stingray	<u>Dasyatis sabina</u>

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